

CHAPTER 3: BASE COURSES

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General

(Refer to Standard Specification 02721)

The Resident Engineer and staff should read and study the above Standard Specification, the plans and Special Provisions to the contract before doing work involving base courses. Such reading and studying can assist the Resident Engineer in proper preparation for the staffing and training necessary to complete the work in conformity with the contract.

Untreated Base Course

Description:

This item consists of the construction of a base course composed of natural gravel, crushed rock, or crushed slag placed on the prepared subgrade in reasonable close conformance with the lines, grades and dimensions shown on the plans or established by the Resident Engineer.

Materials:

The Standard Specifications stipulate required tests and methods. It is necessary to refer to this source of information repeatedly as the work proceeds. Failure to do so may result in failure to comply with existing specifications. Such failure is costly to the State and very difficult to correct.

Gradation:

The Contractor is required to submit in writing, a job-mix gradation prior to placing Untreated Base Course on the roadbed. Changes in the job-mix gradation may be made prior to a day's production, subject to the approval by the Resident Engineer. A written request for a change is required. Retroactive changes are allowed **only** on the first production day. Keep these records on file. Acceptance or non-acceptance is based upon the job mix gradation provided by the Contractor.

In the event the gradation of the UTBC produced does not meet the gradation specifications and if the Contractor elects not to remove or reprocess the base course, the quantity of material represented is unacceptable. Unless action is taken to correct the gradation deficiency or a written request from the Contractor is received which requests acceptance of this material at an appropriate price adjustment, the material should not be accepted or paid for. A letter has been prepared for this purpose, ([Form C-106 Price Reduction Notification](#)) wherein the Resident Engineer notifies the Contractor within 3 working days of the factor and price adjustment. The Contractor countersigns signifying the corrective action that will be taken or agrees to the reduced

payment for the material. If the pay factor is less than 0.70, the Resident Engineer is not required to accept the material at a price adjustment and may order it to be removed.

Testing should be completed within 24 hours of processing and placement of the UTBC. Test results revealing non-specification material should be communicated to the contractor the same day they are received by the Resident Engineer. Where notification cannot be made the same day, such notification must be made within 24 hours of receiving the test results.

Materials Acceptance:

[\(Refer to Material Manual; Section 1011\)](#)

Acceptance tests are performed under the direction of the Resident Engineer by individuals who have met the qualifications of the UDOT TTQP and in Laboratories that have met the requirements of the UDOT LQP. Tests are performed in accordance with the most recent cited methods of AASHTO, ASTM, and Western Alliance for Quality Transportation Construction (WAQTC) and this Manual of Instruction.

Sampling and Testing:

[\(Refer to Minimum Sampling and Testing Guide\)](#)

Sampling and testing is done in accordance with UDOT Minimum Sampling and Testing Requirements. Care should be taken to determine in advance of manufacture, the testing methods required by the Contract. The Contract requirement will determine the sampling and testing methods, which must be used.

Methods of sampling and the required testing of materials are stipulated in the following documents:

1. Special Provisions
2. Standard Specifications
3. UDOT Minimum Sampling and Testing Guide
4. AASHTO Manual

Any time a difference in the material is observed (i.e. color, texture, moisture etc.), samples should be taken and new tests run to ensure compliance with the specifications. We have the right and obligation to perform additional testing when a variance in the material is observed.

Reports:

[Base and Surface Report T-138](#)

Is to be submitted for each production day.

Construction Methods:

Refer to the Special Provisions and Standard Specifications. A seemingly minor difference in required construction methods may be cause for a Contractor to initiate a claim. Follow prescribed construction methods exactly. Make daily diary entries concerning any changes.

Compaction:

In addition to the requirements of the Specifications, the Resident Engineer must be alert for failure to meet density requirements because of mechanical difficulties of the equipment or for any other reason. The fact that the test lot density results are satisfactory does not automatically result in acceptance of the density of the entire roadway under consideration. Prompt notification of density testing is important, especially when these results are substandard or marginal.

Finishing:

The quality of finish or the “ride” ultimately attained is reflected through, to some extent, each layer of material placed. Surface deviations should be checked with a straight edge or string line. In using those tools, be sure to cover a representative amount of surface area. Document these measurements in a field book or diary. Mark the areas that need correction so they are visible to the Contractor and the necessary corrections can be made.

Method of Measurement:

The contract determines the method of measurement to be used. If the method of measurement is by area, i.e., typical section, methods outlined in the contract must be followed precisely in order to yield proper results. If the method of measurement is by weight, then weighing devices of an approved type must be used to accomplish this activity. Scales used for weighing must be certified by the Department of Agriculture.

Be sure to document UTBC as required by the contract. There is no economy gained in weighing material to be paid by area; likewise, measuring an area is futile if payment is to be made by weight. Weigh person should periodically clean scales and platform to remove gravel spillage. The Contractor should clean up any large spills. Maintain a staggered time schedule of securing tare weights of trucks and make a permanent record in the weigh book using

[Form C-112, Scale-person's Daily Report.](#)

Basis of Payment:

No separate payment is made for finishing base courses. When providing information upon which payment is based, it is mandatory that all of the specified requirements be met. Refer to the Standard Specifications. Always consult with the Resident Engineer

before initiating a price adjustment. Their judgment in this particular activity must be relied upon to protect the State from costly litigation.

In order to properly make payment for work done, it is necessary to make constant reference to the Specifications. Deviations from methods prescribed in the Specifications could lead to difficulty.

Price Adjustment:

Pay factors for gradations and density are to be determined independently. The final pay factor for untreated base course is determined by multiplying the pay factor for gradation with the pay factor for density. If the resulting product falls below 0.70, the Resident Engineer may order the removal of any or all the untreated base course in the lot. The final pay factor for any such base course, which is allowed to remain in place, is 0.50

Written confirmation of test results is required on all non-specification material using [Form C-106](#), Price Reduction Notification.

If gradation requirements for Untreated Base Course are not achieved and if the Contractor elects not to remove, replace or blend the base course aggregates, the quantity of material represented by the particular test is unacceptable.

Unless action is taken to correct the deficiency or a written request from the Contractor is received accepting a price reduction, this material cannot be accepted as part of the project nor can payment be made for the material. [Form C-106](#), Price Reduction Notification, a copy of which is found in the Forms section of this Manual has been prepared for this purpose. With this form letter the Resident Engineer notifies the Contractor of the pay factor and price adjustment and the Contractor countersigns, signifying which alternative is acceptable. If the pay factor is less than 0.07, the Resident Engineer is not required to accept the material at a reduced price. See the options listed on the form letter.

Hydrated Lime Treated Roadbed

Description:

This item consists of a treated roadbed composed of base course material or soil obtained from scarifying the material in place, hydrated lime and water mixed and compacted on the roadbed in conformance with the lines, grades and dimensions shown on the plans or as established by the Resident Engineer.

Soil:

Roadbed shall consist of the use of base course material or in-place soils.

Hydrated Lime:

Hydrated lime conforms to the requirements in [Standard Specification 02746](#).

Water:

Water for mixing conforms to the requirements in the specified test standard of [AASHTO M -241](#).

Asphaltic Material:

(Refer to [Standard Specification 02745](#))

Roadbed Preparation:

[Standard Specification 02715](#) adequately describes methods to be used. Complete scarification and pulverization of the soil to be treated is important, a thorough inspection of the operation is necessary to assure readiness for treatment.

Proportioning and Mixing:

At this point in the construction process, an on-site conference will make concerned parties aware of their responsibilities.

Compaction:

[Standard Specification 02715 Part 3.4](#) adequately describes the requirements.

Finishing:

Bring the roadbed to within " 0.1 ft of line and grade.

Membrane Seal:

When required by typical section, asphalt of type and grade shown is to be used to provide a seal over the treated base course. The Sealant is part of the item: therefore, quality tests are required, but no detailed area description or separate payment is necessary.

Weather Limitations:

No waiver of weather limitations can be made at the project level. The Region Materials Engineer will determine if it is reasonable to place Hydrated Lime Treated Roadbed below the required placement temperature.

Method of Measurement:

(Refer to [Standard Specification 01280](#)).

Lean Concrete Base Course:

Description:

Lean concrete base is made with aggregate base or concrete aggregate and sufficient cement to achieve the desirable strength. Mix design, testing and inspection are handled the same as with concrete paving. Water reducing agents, fly ash and entrainment are allowed (if specifically approved) but are not generally required.

On some project the use of air entraining agents caused tearing of the base surface; it is advisable to be alert to this problem.

Placing, Finishing and Curing:

The base is mixed in conventional concrete mixers, hauled to the grade in open bed dump trucks or mixer trucks and placed with a slip form paver. Dump trucks are used primarily because of the speed with which they can be loaded and unloaded; mixer trucks are primarily used for small placements.

The specifications will specify the width of the base, which is usually the full width of the PCC plus an added increment for small placements.

White pigmented curing compound is applied as soon as finishing is completed. Another application of curing compound may be specified just before placing the PCC. The last coat must be protected from damage because it serves as a bond breaker between the base and the pavement.

Keep all traffic off for the least 72 hours; including the Contractor and UDOT, this is very important because of the low strength developed by the base. Even after 72 hours has elapsed, traffic should be restricted to the absolute minimum needed to complete the PCC pavement.

As it gains strength the lean base will crack but this is natural so no attempt is made to control or seal cracks.

Measurement for Payment:

[Standard Specification 02752](#), has detailed instructions on the method of measuring thickness of cores for payment.

The measurement, re-measurement and location of thickness deficient areas are to be performed strictly according to the Standard Specifications.